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METHOD AND APPARATUS FOR PROCESSING ELECTRONIC RECORDS
FOR PHYSICAL TRANSACTIONS
BACKGROUND OF THE INVENTION

5 1. Technical Field:

The present invention relates generally to an improved data processing system, and in particular to a method and apparatus for processing data. Still more particularly, the present invention provides a method and 10 apparatus for processing electronic records.

2. Description of Related Art:

When a customer goes to a business establishment to obtain services or to purchase items, a transaction 15 occurs. This transaction is a physical transaction in which a customer travels to a business establishment and obtains services or purchases an item at the business establishment. In this transaction, details are typically present about the transaction that the customer 20 desires to obtain. For example, if a customer takes an automobile to a service station for an oil change, the customer may desire to obtain details about the transaction, such as, for example, the amount of oil used, the type of oil used, the mileage, the date of the 25 service, the price for the service, and the name of the service station.

Currently, a customer is required to obtain this information by either asking a representative of the service station for the information or by extracting the 30 information from a physical receipt from the transaction. Such an operation is time-consuming and sometimes

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frustrating for the customer. In addition to having to actively obtain the information, the customer also is required to enter this information into a database or program used by the customer. For example, the customer 5 may desire to enter the information into an accounting program that maintains records and generates budgets.

Therefore, it would be advantageous to have an improved method and apparatus for processing information relating to a physical transaction.

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Year	Population	Area (sq. miles)	Density (per sq. mile)
1850	1,000,000	100,000	10
1860	1,500,000	100,000	15
1870	2,000,000	100,000	20
1880	2,500,000	100,000	25
1890	3,000,000	100,000	30
1900	3,500,000	100,000	35
1910	4,000,000	100,000	40
1920	4,500,000	100,000	45
1930	5,000,000	100,000	50
1940	5,500,000	100,000	55
1950	6,000,000	100,000	60
1960	6,500,000	100,000	65
1970	7,000,000	100,000	70
1980	7,500,000	100,000	75
1990	8,000,000	100,000	80
2000	8,500,000	100,000	85
2010	9,000,000	100,000	90
2020	9,500,000	100,000	95

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SUMMARY OF THE INVENTION

The present invention provides a method and apparatus for processing transactions. In particular, the mechanism of the present invention is used for processing information for physical transactions. A data structure is received at a customer data processing system for a physical transaction entered into by the customer. This information is extracted and used to update records or other information in the customer data processing system. Further, a second data structure is sent to a supplier of an item used in the physical transaction. This data structure is used by the supplier to update information maintained by the supplier about the item. After updating the information, the information is analyzed to generate statistics about physical transactions involving the item.

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BRIEF DESCRIPTION OF THE DRAWINGS

The novel features believed characteristic of the
5 invention are set forth in the appended claims. The
invention itself, however, as well as a preferred mode of
use, further objectives and advantages thereof, will best
be understood by reference to the following detailed
description of an illustrative embodiment when read in
10 conjunction with the accompanying drawings, wherein:

Figure 1 depicts a diagram of entities involved in
processing data for physical transactions in accordance
with a preferred embodiment of the present invention;

15 **Figure 2** is a pictorial representation of a network
of data processing systems in which the present invention
may be implemented;

20 **Figure 3** is a block diagram of a data processing
system that may be implemented as a server in accordance
with a preferred embodiment of the present invention;

Figure 4 is a block diagram illustrating a data
processing system in which the present invention may be
implemented;

25 **Figure 5** is a diagram of a client in the form of a
personal digital assistant (PDA) in accordance with a
preferred embodiment of the present invention;

Figure 6 is a block diagram of a PDA in accordance
with a preferred embodiment of the present invention;

30 **Figure 7** is an illustration of an entry for a data
structure in accordance with a preferred embodiment of
the present invention;

Figure 8 is a data structure illustrated in

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accordance with a preferred embodiment of the present invention;

5 **Figure 9** is a flowchart of a process used for importing data structures in accordance with a preferred embodiment of the present invention;

Figure 10 is a flowchart of a process used by a business entity for creating data structures in accordance with a preferred embodiment of the present invention; and

10 **Figure 11** is a flowchart of a process used by a supplier to receive and process data structures in accordance with a preferred embodiment of the present invention.

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference now to the figures, **Figure 1** depicts a 5 diagram of entities involved in processing data for physical transactions in accordance with a preferred embodiment of the present invention. In this example, a customer, such as customer 100 or customer 102 may obtain services or items from various business establishments, 10 such as business establishments 104-108. Items purchased or obtained in connection with a service may originate from a supplier such as supplier 110 or 112. The suppliers may be manufacturers, distributors, or some other entity, which provides items to business 15 establishments 104-108. The items may take various forms depending on the particular implementation. For example, the items may be automotive items, such as oil, tires, body parts, and various accessories.

When a customer, such as customer 100, travels to a 20 business establishment, such as business establishment 104, customer 100 may enter into a physical transaction with business establishment 104. With the example of automotive items, customer 100 may desire details about the transaction for personal records. These details may 25 include, for example, customer name, customer address, mileage of vehicle at service time, vehicle identification, and vehicle year. Also, the description of the item, as well as the price of the item, also are typically desired by customer 100. In this example, a 30 standardized record, such as data structure 114, is created by business establishment 104 and sent to customer 100. Data structure 114 is sent electronically. This

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data structure may be sent in a number of different ways, such as, for example, as an electronic mail message attachment to the address for customer 100 or through a wireless data link to a personal digital assistant (PDA) 5 carried by customer 100.

Additionally, a data structure 116 also may be transmitted to supplier 110 in response to the same physical transaction. Data structure 116 may be a duplicate of data structure 114 or may be modified to 10 protect the privacy of customer 100. The modification may take out personal identification information such as the customer name and address. Fields within data structures 114 and 116 may include mandatory fields that are found in all data structures used to enable different data 15 processing system systems and programs to receive and import the information form these data structures. The data structures are also referred to as electronic records. If more than one item is present from more than one supplier the a data structure may be sent to each 20 supplier.

With this information a customer may update personal records, such as a database containing a budget or a set of maintenance records. For example, with an oil change, a data structure may be sent to the customer with details 25 about the oil change. A budget database for the customer may be updated automatically upon receiving the data structure.

A supplier receiving the data structure may update its records using the data structure and track the 30 purchase and use of items by different customers. This information may be analyzed to produce statistics on the

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use of items as well as demand for items in different geographic regions.

Turning next to **Figure 2**, Network data processing system 200 is a network of computers in which the present invention may be implemented. Network data processing system 200 contains a network 202, which is the medium used to provide communications links between various devices and computers connected together within network data processing system 200. Network 202 may include 5 connections, such as wire, wireless communication links, or fiber optic cables. Data processing system 200 may be used to interconnect different entities, such as 10 customers, business establishments, and suppliers.

In the depicted example, a server 204 is connected to 15 network 202 along with storage unit 206. In addition, clients 208, 210, and 212 also are connected to network 202. These clients 208, 210, and 212 may be, for example, 20 personal computers or network computers. In the depicted example, server 204 provides data, such as boot files, operating system images, and applications to clients 208-212. Clients 208, 210, and 212 are clients to server 204. Network data processing system 200 may include additional servers, clients, and other devices not shown. In these examples, server 204 may be located at a business 25 establishment to generate electronic records while clients 208-212 may be located at a customer location or at a supplier location.

In the depicted example, network data processing system 200 is the Internet with network 202 representing a 30 worldwide collection of networks and gateways that use the TCP/IP suite of protocols to communicate with one another.

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At the heart of the Internet is a backbone of high-speed data communication lines between major nodes or host computers, consisting of thousands of commercial, government, educational and other computer systems that

5 route data and messages. Of course, network data processing system 200 also may be implemented as a number of different types of networks, such as for example, an intranet, a local area network (LAN), or a wide area network (WAN). **Figure 2** is intended as an example, and not

10 as an architectural limitation for the present invention.

Referring to **Figure 3**, a block diagram of a data processing system that may be implemented as a server, such as server 204 in **Figure 2**, is depicted in accordance with a preferred embodiment of the present invention.

15 Data processing system 300 may be a symmetric multiprocessor (SMP) system including a plurality of processors 302 and 304 connected to system bus 306. Alternatively, a single processor system may be employed. Also connected to system bus 306 is memory

20 controller/cache 308, which provides an interface to local memory 309. I/O bus bridge 310 is connected to system bus 306 and provides an interface to I/O bus 312. Memory controller/cache 308 and I/O bus bridge 310 may be integrated as depicted.

25 Peripheral component interconnect (PCI) bus bridge 314 connected to I/O bus 312 provides an interface to PCI local bus 316. A number of modems may be connected to PCI bus 316. Typical PCI bus implementations will support four PCI expansion slots or add-in connectors.

30 Communications links to network computers 208-212 in **Figure 2** may be provided through modem 318 and network

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adapter 320 connected to PCI local bus 316 through add-in boards.

Additional PCI bus bridges 322 and 324 provide interfaces for additional PCI buses 326 and 328, from 5 which additional modems or network adapters may be supported. In this manner, data processing system 300 allows connections to multiple network computers. A memory-mapped graphics adapter 330 and hard disk 332 may also be connected to I/O bus 312 as depicted, either 10 directly or indirectly.

Those of ordinary skill in the art will appreciate that the hardware depicted in **Figure 3** may vary. For example, other peripheral devices, such as optical disk drives and the like, also may be used in addition to or in 15 place of the hardware depicted. The depicted example is not meant to imply architectural limitations with respect to the present invention.

The data processing system depicted in **Figure 3** may be, for example, an IBM RISC/System 6000 system, a product 20 of International Business Machines Corporation in Armonk, New York, running the Advanced Interactive Executive (AIX) operating system.

With reference now to **Figure 4**, a block diagram illustrating a data processing system is depicted in which 25 the present invention may be implemented. Data processing system 400 is an example of a client computer. Data processing system 400 employs a peripheral component interconnect (PCI) local bus architecture. Although the depicted example employs a PCI bus, other bus 30 architectures such as Accelerated Graphics Port (AGP) and Industry Standard Architecture (ISA) may be used.

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Processor 402 and main memory 404 are connected to PCI local bus 406 through PCI bridge 408. PCI bridge 408 also may include an integrated memory controller and cache memory for processor 402. Additional connections to PCI local bus 406 may be made through direct component interconnection or through add-in boards. In the depicted example, local area network (LAN) adapter 410, SCSI host bus adapter 412, and expansion bus interface 414 are connected to PCI local bus 406 by direct component connection. In contrast, audio adapter 416, graphics adapter 418, and audio/video adapter 419 are connected to PCI local bus 406 by add-in boards inserted into expansion slots. Expansion bus interface 414 provides a connection for a keyboard and mouse adapter 420, modem 422, and additional memory 424. Small computer system interface (SCSI) host bus adapter 412 provides a connection for hard disk drive 426, tape drive 428, and CD-ROM drive 430. Typical PCI local bus implementations will support three or four PCI expansion slots or add-in connectors.

An operating system runs on processor 402 and is used to coordinate and provide control of various components within data processing system 400 in Figure 4. The operating system may be a commercially available operating system, such as Windows 2000, which is available from Microsoft Corporation. An object oriented programming system such as Java may run in conjunction with the operating system and provide calls to the operating system from Java programs or applications executing on data processing system 400. "Java" is a trademark of Sun Microsystems, Inc. Instructions for the operating system, the object-oriented operating system, and applications or

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programs are located on storage devices, such as hard disk drive 426, and may be loaded into main memory 404 for execution by processor 402.

Those of ordinary skill in the art will appreciate 5 that the hardware in **Figure 4** may vary depending on the implementation. Other internal hardware or peripheral devices, such as flash ROM (or equivalent nonvolatile memory) or optical disk drives and the like, may be used in addition to or in place of the hardware depicted in 10 **Figure 4**. Also, the processes of the present invention may be applied to a multiprocessor data processing system.

As another example, data processing system 400 may be a stand-alone system configured to be bootable without 15 relying on some type of network communication interface, whether or not data processing system 400 comprises some type of network communication interface. As a further example, data processing system 400 may be a Personal Digital Assistant (PDA) device, which is configured with 20 ROM and/or flash ROM in order to provide non-volatile memory for storing operating system files and/or user-generated data.

The depicted example in **Figure 4** and above-described examples are not meant to imply architectural 25 limitations. For example, data processing system 400 also may be a notebook computer or hand held computer in addition to taking the form of a PDA. Data processing system 400 also may be a kiosk or a Web appliance.

With reference now to **Figure 5**, a diagram of a 30 client in the form of a personal digital assistant (PDA) is depicted in accordance with a preferred embodiment of

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the present invention. PDA 500 includes a display 502 for presenting textual and graphical information. Display 502 may be a known display device, such as a liquid crystal display (LCD) device. The display may be 5 used to present a map or directions, calendar information, a telephone directory, or an electronic mail message. In these examples, screen 502 may receive user input using an input device such as, for example, stylus 510.

10 PDA 500 may also include keypad 504, speaker 506, and antenna 508. Keypad 504 may be used to enter user input in addition to using screen 502. Speaker 506 provides a mechanism for audio output, such as presentation of an audio file. Antenna 508 provides a 15 mechanism used in establishing a wireless communications link between PDA 500 and a network, such as network 202 in **Figure 2**.

20 PDA 500 also preferably includes a graphical user interface that may be implemented by means of systems software residing in computer readable media in operation within PDA 500.

25 Turning now to **Figure 6**, a block diagram of a PDA is shown in accordance with a preferred embodiment of the present invention. PDA 600 is an example of a PDA, such as PDA 500 in **Figure 5**, in which code or instructions implementing the processes of the present invention may be located. PDA 600 includes a bus 602 to which processor 604 and main memory 606 are connected. Display adapter 608, keypad adapter 610, storage 612, and audio adapter 30 614 also are connected to bus 602. Cradle link 616 provides a mechanism to connect PDA 600 to a cradle used

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in synchronizing data in PDA 600 with another data processing system. Further, display adapter 608 also includes a mechanism to receive user input from a stylus when a touch screen display is employed.

5 An operating system runs on processor 604 and is used to coordinate and provide control of various components within PDA 600 in **Figure 6**. The operating system may be, for example, a commercially available operating system such as Windows CE, which is available from Microsoft
10 Corporation. Instructions for the operating system and applications or programs are located on storage devices, such as storage 612, and may be loaded into main memory 606 for execution by processor 604.

Those of ordinary skill in the art will appreciate
15 that the hardware in **Figure 6** may vary depending on the implementation. Other internal hardware or peripheral devices, such as flash ROM (or equivalent nonvolatile memory) or optical disk drives and the like, may be used in addition to or in place of the hardware depicted in
20 **Figure 6**.

Turning next to **Figure 7**, an illustration of an entry for a data structure is depicted in accordance with a preferred embodiment of the present invention. Entry 700 includes a field name 702, a field length 704, and a field 706. Field name 702 is used to identify the field, while field 704 defines the length of field 706. Various information may be placed in an entry, such as entry 700. For example, customer name, a vehicle name, mileage, price, and item description may be placed into field 706
30 in entry 700.

With reference next to **Figure 8**, a data structure is

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illustrated in accordance with a preferred embodiment of the present invention. In this example, data structure 800 contains a version number 802, date 804, time 806, a nickname 808, a cost 810, work performed 812, items 814, 5 payment type 816, and comments 818.

In these examples, version number 802, date 804, and time 806 are contained within a header in data structure 800. Based on the version number, an identification of the size and type of data may be made such that the use 10 of field name and field length definitions, such as those used in entry 700 in **Figure 7** are unnecessary. Nickname 804 may be used to identify a particular vehicle for a user. Cost 810, work performed 812, and items 814 identify information about the service itself. Payment 15 type 816 indicates how the customer paid for the service.

Referring to **Figure 9**, a flowchart of a process used for importing data structures is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 9** may be implemented in a 20 client data processing system such as data processing system 400 in **Figure 4** or PDA 600 in **Figure 6**. This process illustrates an exemplary use by customer of a data structure in accordance with a preferred embodiment of the present invention. In this example, the data structure 25 represents a transaction involving service for a vehicle.

The process begins by receiving the data structure (step 900). This data structure may be received by the customer in a number of different ways. For example, the data structure may be sent to the customer in an 30 electronic mail message. Alternatively, the data structure may be transferred to the customer PDA through a

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wireless connection prior to the customer leaving the business establishment.

Next, the data structure is imported for use locally into the local records (step 902). The importing of the data structure may be performed using a process or program, which recognizes the data structure and the fields within the data structure. With a standardized data structure, a common process or program may be used by customers and suppliers. After this step occurs, the transaction is entered into a financial program (step 904). The entry of the transaction into a financial program in this example involves placing the information into the database associated with the financial program. The process importing the information also may place the information within the financial program. In this example, the process recognizes fields within the data structure used by the financial program and formats that information for placement into the financial program. Finally, the next service date is projected (step 906). In addition, the information from the data structure may be used by another program to project another service date for the vehicle.

Turning now to **Figure 10**, a flowchart of a process used by a business entity for creating data structures is depicted in accordance with a preferred embodiment of the present invention. The process illustrated in **Figure 10** may be implemented in a data processing system at a business entity. This process may be implemented in a data processing system, such as data processing system 300 in **Figure 3**.

The process begins by receiving the service item

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(step 1000). The item is one involved in the transaction with the customer. The item may be selected from an inventory database of items available at the business establishment. This item may be received as a selection 5 of the item for sale or use in providing service for a customer. After the item is identified, it is processed (step 1002). The processing of the item in this example involves removing it from the inventory database. Next, a data structure is created and sent to the customer 10 (step 1004). This data structure may be, for example, data structure 800 in Figure 8. The information within the fields of the data structure may be retrieved from an inventory database or entered by a user in completing the physical transaction with the customer.

15 After this step occurs, the manufacturer for the item is identified (step 1006). After the aforementioned manufacturer is identified, the data structure is modified (step 1008). Step 1008 is an optional step in which information may be removed from the data structure 20 to protect the privacy of the customer. For example, the name and other personal information about the customer may be removed from the data structure.

Next, the modified data structure is sent to the supplier (step 1010). A determination is made as to 25 whether more manufacturers are present that require information (step 1012). The physical transaction may involve multiple items supplied by different suppliers. If more suppliers are not present, the process terminates. If, however, more suppliers are needed, the 30 next supplier is selected (step 1014). After the next supplier is selected, the process returns to step 1008,

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where the data structure is modified.

The supplier data sent in the process described in **Figure 10** may be sent on a regular basis, such as daily or monthly instead of after each transaction.

5 Turning now to **Figure 11**, a flowchart of a process used by a supplier to receive and process data structures is depicted in accordance with a preferred embodiment of the present invention. This process is used by a supplier, such as a manufacturer or distributor of items
10 10 to analyze the use and purchase of items.

The process begins by receiving a data structure (step 1100). This data structure in these examples are received from a business entity, but also may be received from customers. Information is extracted from the data
15 15 structure (step 1102). The information is then placed in a database for analysis (step 1104). This database may contain information for a particular type of item or for all items supplied by the supplier. The database is then analyzed (step 1106). This analysis may include
20 20 statistical analysis of the information for various factors, such as what items are purchased more frequently during certain periods of time or in selected geographic regions. Additionally, depending on the information included in the data structure, an analysis of
25 25 demographics of customers purchasing the items also may be made. Based on this analysis, statistics and projections are generated (step 1108) with the process terminating thereafter. These statistics and projections may be used by the supplier to make business decisions
30 30 such as, for example, how much of an item to keep in inventory and whether to keep certain items in inventory

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during certain periods of time.

It is important to note that while the present invention has been described in the context of a fully functioning data processing system, those of ordinary skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog communications links, wired or wireless communications links using transmission forms, such as, for example, radio frequency and light wave transmissions. The computer readable media may take the form of coded formats that are decoded for actual use in a particular data processing system.

The description of the present invention has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art. For example, items may encompass automobiles in addition to parts for automobiles and may extend to non-automotive items, such as perishable goods and building supplies. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the

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invention for various embodiments with various modifications as are suited to the particular use contemplated.